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COTTON.

By A. B. ACKLAND and C. H. WRIGHT.

REVIVAL OF THE COTTON INDUSTRY IN FIJI.

Attention is drawn to the following notice which appeared in the local press:—

"It is hereby notified that the Government is hoping to obtain 3 tons of sea-island cotton seed in time for planting in December next.

"The cotton seed on arrival will be distributed pro rata amongst the applicants at cost price. Applications for cotton seed should be sent to the undersigned; and applicants should state the number of acres they propose to plant or the weight of seed required allowing 5 to 6 lb of seed to the acre."

It will be remembered that, after preparations had been made in 1920 for the revival of the cotton industry in Fiji, a pest was reported in the Colony in which seed had been ordered and that the seed, which was *en route* to Fiji, was destroyed in consequence. Efforts are again being made to re-establish this industry and the following notes are published with a view to informing intending planters of the steps taken in the matter.

Seed.—It has been decided that only sea-island seed be imported as this variety has been thoroughly tried in Fiji and has proved suitable.

The Government has been in communication with the Imperial Department of Agriculture for the West Indies and has arranged for the supply of 6,000 lb of Barbados sea-island cotton seed at 6d. per lb f.o.b. provided that the seed is certified free of pests. The Imperial Department of Agriculture has been requested to arrange shipment *via* London in time for transhipment to the s.s. "Australcrag," which is due to load in September next. The seed should therefore arrive in ample time for planting in December and January.

Machinery.—In consequence of inquiries made the Government has been informed by telegram that the British Cotton Growing Corporation has offered to supply ginning machinery up to £500 in value to be paid for by instalments over a three years period.

Details of the scheme for the ginning of cotton, seed control, &c., are still under consideration and information on this point will be supplied later. Planters should bear in mind that the long staple sea-island variety is ginned by roller gins and that the short staple upland varieties are ginned by saw gins. While the trial of new varieties of cotton is desirable, the above facts should not be lost sight of as the Government has no intention at present of importing machinery to deal with short staple varieties.

Advances on Crops.—The British Cotton Growing Association advised in 1920, that it would be prepared to allow growers to draw up to 70 per cent. of the market value of cotton on shipment and the Corporation has advised the Government that this offer still holds good. It will be necessary for samples of lint to be posted in advance of shipments for examination and report as to value.

Guarantee of Minimum Price.—The Government is making inquiries regarding the guarantee of a fixed minimum price for cotton for a number of years as is done in the case of Queensland. Information in regard to this point will be furnished later.

The Empire Cotton Growing Corporation.

The following information regarding the Empire Cotton Growing Corporation will be of interest to intending cotton planters:—

The first step towards the formation of the Empire Cotton Growing Corporation was the appointment of a Committee on the 25th July, 1917, "to investigate the best means of developing the growing of cotton within the Empire and to advise the Government as to the necessary measures to be taken for this purpose." This Committee in their report dated 22nd October, 1919, stated (*inter alia*) that they were convinced that it is possible for the Empire to make good the world's shortage of cotton, but that the one conclusion that stood out plainly and definitely as the result of their work was that this achievement was beyond the powers of any Committee and that it could only be accomplished by the united efforts of the British Government and the Governments of the cotton growing Dominions, Colonies, and Protectorates supported by the active interest and cordial co-operation of all who might be engaged in the cotton industry of the Empire.

The Committee inquired into the matter of the provision of funds for the promotion of cotton growing in the Empire and, after consulting the principal cotton Associations in the United Kingdom and with the approval of at least ninety per cent. of the total number of spindles operated within the United Kingdom, the Liverpool and Manchester Cotton Associations have passed by-laws providing for a levy at the rate of 6d. for every 500 lb or portion thereof on all invoices for cotton forwarded to spinners in the United Kingdom who have agreed to this charge, the proceeds of which levy are to be paid to the Corporation and which charge is expected to yield about £100,000 per annum. The British Government has approved of a grant of £978,715 to the Corporation subject to the contributions from the industry above referred to. It is also expected that additional funds may be forthcoming from time to time for the promotion of the objects of the Corporation.

The Corporation was granted a Charter bearing date the 1st November, 1921, and was established and incorporated with the object of extending and promoting, in the interests of the Empire, the growing and cultivation of cotton in the Dominions, Colonies, Protectorates, &c., and for such purpose the Corporation was specially authorised and empowered amongst other things—

(1) to establish and maintain or assist in the establishment or maintenance of institutions engaged in promoting knowledge of the nature, habits, growth, cultivation, production, treatment, use or marketing of cotton;

(2) to solicit and receive subscriptions, donations, subsidies, &c., and to apply the same for the purpose of the Corporation;
(3) to acquire and hold land, buildings, &c., in any of the Dominions, Colonies, &c., for the purposes and objects of the Corporation;
(4) to acquire and hold land, buildings, &c., in the United Kingdom of a yearly value not exceeding £10,000 and not exceeding 1,000 acres in all at any one time for the purposes and objects of the Corporation;
(5) to make experiments and trials in the growing, treatment, and use of cotton and to establish cotton plantations or farms and to give instructions on such plantations or farms or elsewhere in growing treating, and using cotton, and to grant subsidies to others to induce them to do any of the matters aforesaid;
(6) to buy and sell or undertake the marketing of cotton and any of its products and any other crops, goods, livestock, or articles incidental to growing, treating, or rendering marketable cotton and to establish and provide stations and storage for such purposes;
(7) to employ experts and others who shall make surveys, examine and make trial of lands in order to ascertain their suitability for cotton growing and to collect and supply information and statistics as to the planting, treatment, marketing and use of cotton and to organise expeditions and to provide them with proper appliances and equipment for the purposes aforesaid;
(8) to buy, sell, lease, deal in and provide all kinds of machinery, plant, gins, utensils, chattels, vehicles, animals, and labour;
(9) in conjunction with the growing of cotton to carry out all kinds of agricultural operations and to carry on business as farmers and graziers and to improve, clean, drain, develop, plant, irrigate, and cultivate any lands;
(10) to disseminate information relating to cotton growing and to make use of patents and other rights and privileges;
(11) to provide mechanical or other power for any of the purposes of the Corporation and to make and maintain or to provide money towards the making, operation, and maintenance of buildings, roads, railways, tramways, vehicles, telegraphs, telephones, quays, stages, docks, harbours, waterworks, and any other works which may tend to the development or improvement of lands belonging to the Corporation or lands on which the Corporation may be interested or on which cotton is or is about to be grown or to the promotion or extension of cotton production;
(12) to make loans, subsidies, contributions and grants of money or money's worth for promoting any of the objects of the Corporation and to guarantee the performance of contracts or the payment of money;
(13) to carry on any lawful commerce, trade, pursuit, business, operation or dealing in connection with the objects of the Corporation;
(14) to establish and maintain agencies in the Dominions, Colonies, &c.
(15) to purchase or hire steamers and vessels for the carriage of goods, machinery and supplies and to act as carriers in relation to the objects of the Corporation;
(16) To subscribe for purchase or take up shares in or advance money to any company or corporation whose objects or business are similar to or capable of being conducted so as to promote the objects of the Corporation and to enter into any joint-working

agreement or co-partnership arrangement with any such company or corporation;

(17) to establish in the Dominions, Colonies, &c., subsidiary associations or companies for carrying out any of the objects of the Corporation;

(18) to do all or any of the above matters in any of the Dominions, Colonies, Protectorates or Protected States provided that none of the powers shall be exercised except for the purpose of extending and promoting the growing and cultivation of cotton.

No part of the capital or income of the Corporation shall be paid or transferred directly or indirectly by way of dividend or otherwise by way of profit to the members of the Corporation, but the whole of the capital and income of the Corporation shall be applied solely towards the promotion of the objects and purposes of the Corporation as set forth in the Charter.

The Corporation shall always be and remain British in character and domicile and shall have its principal office situate in Great Britain and the Members of the Board of Trustees and the Administrative Council of the Corporation shall always be British subjects.

The Corporation shall not do, suffer or permit any act or thing whereby, or in consequence whereof, the Corporation shall pass under the control of, or become subject to, the control of any foreign Government or person.

A. B. Ackland.

Hints on Cotton Growing.

(*Compiled chiefly from A.B.C. of Cotton Planting, Pamphlet No.* 31, *Imperial Department of Agriculture for the West Indies.*)

Climate.—Sea-island cotton requires a rainfall of under 100 inches per annum, and if the rainfall is excessive cotton will not give good crops. The rainfall in parts of the provinces of Colo West, Nadroga, Nadi, Lautoka, Ba, Ra, Bua, and Macuata is suitable for cotton, and it is recommended that cotton be planted in those parts of the Colony only.

Situation and Soil.—The locality should have good soil not exposed to strong winds, because the plants if blown about and injured do not bear well. The soil should be well drained, as cotton will not thrive in land where the drainage is deficient.

Preparation of Land.—At the beginning of November the land should be ploughed or forked and all weeds burnt. After a few weeks, lumps should be broken down and the soil reduced to a fine tilth.

Planting.—The better the land the greater distance apart the seeds may be planted and the poorer the land the shorter the distance. Cotton generally grows best when planted about 2 feet apart in rows about 5 feet apart. Four seeds should be planted in each hole about an inch deep in wet weather between the middle of December and the middle of January, and some seed should be kept for replanting the holes where the seeds fail to germinate.

After Treatment.—With favourable weather the seedlings will appear above ground in about four days. At the end of a fortnight from the time the seeds are sown, the holes where the seeds have failed to germinate should be resown. As soon as the plants are about two weeks old the weaker ones should be pulled up leaving the two strongest plants in the hole. About two weeks later the weaker of the two remaining plants should be pulled up leaving the stronger. The plants pulled up can be used at this time for planting in any holes, where the seeds have still failed to germinate.

When the plants are about 8 inches high they should be hilled or moulded up to prevent their being damaged by the wind, and when they are about 12 to 15 inches high they should be again moulded up. The land should be kept free from weeds until the cotton plants cover the soil and prevent the weeds from growing. As soon as the bolls begin to form weeding should cease, in order to keep the bolls free from dust.

Picking.—Cotton should be picked when the boll is fully opened. The picker should be provided with a canvas bag 2 feet long and 18 inches wide to hang from the shoulders, and thus leave both hands free. The boll should be held firmly in the left hand and the seed-cotton (*i.e.*, seeds with adhering lint) removed with the right hand with one pull, and great care should be taken to see that bits of leaves, &c., do not get mixed with the seed-cotton. If anything should get attached it should be picked off at once before the cotton is placed in the bag. Stained cotton and unripe cotton are worthless and should not be picked. The cotton should only be picked in dry weather, and after picking should be sunned until it is perfectly dry.

C. H. Wright.

VISIT TO FOTUNA AND WALLIS ISLAND.

By H. W. Simmonds, F.E.S., Acting Government Entomologist.

I left Levuka on Saturday, 20th May, by the a.s. " Makoa," arriving at Fotuna after a very rough passage on Wednesday 25th at 10 a.m. Fotuna is an ancient volcanic island with a fringing reef, and rises rapidly from the coast to a little over 2,000 feet, having only a very narrow belt of flat land along certain portions of the coast.

Coconuts are grown to a considerable elevation, and I saw nuts bearing fairly well at approximately 1,000 feet. The central portion of the island is still in heavy bush, except for a small quantity of open fern land of apparently poor quality. Guava was noticed at one place at an elevation of about 800 feet, but did not seem to spread, possibly owing to the absence of flying foxes, which from inquiries I made seem to be unknown.

Large numbers of pigs are kept, and these are prevented from getting into the centre of the island by a wall, which is carried round the island, outside of which they feed, and inside of which cultivation of root crops is carried on.

Coconuts in Fotuna.

Seen from the coast the trees all looked well, although at one or two places a recent gale had done some damage. Closer examination showed the presence of the following diseases:—

1. *Promecotheca reichei.*—The leaf mining beetle. This was well distributed, but nowhere severe. A large number of eggs and larval borings were examined, and evidence of parasitic attacks in both stages observed. The egg parasite, *Chætostricha* sp. ?, was bred out, and appears very similar to the one which I obtained recently at Cicia, and which I am informed by the Imperial Bureau of Entomology is a new species. The larval parasite was not obtained, but two borings were found with clusters of what appeared to be dipterous ova, but I had no opportunity to investigate these further.

2. *Agonoxena* species near *argaula.*—This leaf eating moth was bred out, and seemed to be a slightly different form to our *A. argaula* lacking the

distinct silver markings of our species. Like our form it was parasitised, and the parasite was bred and seems indentical with the *Chalcid* which I obtained from Vunilagi, and which has not yet been named.

3. A scale probably *Hemichionaspis minor* which I only saw twice.

4. There was also evidence of *Phasmidæ* (stick insect) attacks, but not abundantly, and none were found.

All the above are present in all parts of Fiji, the difference in form being so slight that there is little doubt that they would be subject to the same parasitic control as our own species. The coconut trees in Fotuna are as is usual in native estates far too close together, in some cases they require three out of four cut out, whilst almost all require some thinning.

Copra.

This is dried in the shell, and in consequence of the wet climate and careless ways of the natives is of very poor quality.

Bananas.

Inquiries with regard to bananas elicited the statement that the root borer, *Cosmopolites sordida*, was not known. I had no opportunity to investigate closely but saw no sign of this pest in the three I was able to dig up. The pyrale moth which causes the scab on the fruit was however present.

Tobacco.

A good deal of tobacco is grown, but it is subject to the attacks of a tineid moth the larvæ of which bore the stem causing abnormal swellings. The plant then produces a large number of small leaves rather like bunchy top in bananas. The moth was bred out and will be sent to London for identification.* The natives open the swellings and remove the larvæ when the plant starts into renewed growth until re-attacked. This moth is also present on the neighbouring island of Alofa and also at Wallis.

Alofa.

This island is separated from Fotuna by a narrow, but deep strait. It is volcanic like Fotuna, and rises in a remarkable series of terraces. It is almost entirely forest clad, there being little cultivation, and no permanent settlement.

Wallis Island.

Leaving Fotuna on Friday, 26th May, at 4 p.m. we reached the entrance to Wallis Island at 6 p.m. next day, the distance being about 150 miles. Wallis Island consists of some ten islands lying within one large reef with only one narrow and dangerous opening. The islands are mostly volcanic and of low elevation (600–700 feet), but two or three are typical sandy coral islets lying along the edge of the reef. All are of great fertility, and coconuts are grown right over them mixed with other cultivation, chiefly bananas and root crops.

Practically all the country except possibly a narrow portion in the centre is, or has been recently in crop, and the islands are the most densely cultivated I have seen in the Pacific. After the land has been some time under cultivation it is abandoned, and then rapidly grows up in Fern, Vau (*Hibiscus* sp.) and other plants. After a lapse of about six years it is again

* The moth answers the description of *Gnorimoschema heliopa* Low, a bad pest of tobacco in India.

cleared of its undergrowth and burned. Yams are then planted amongst the dead stumps, and the land is again brought into cultivation.

Coconuts in Wallis.

Both *P. reichei* and the *Agonoxena argaula* were present here as in Fotuna, and stick insect attacks were also noticed. I saw one small beetle boring probably *Calandra taitensis*. Most of the trees were very tall, and the number I could examine was rather limited. No spathe borer, bud-rot, or sign of Rhinoceros beetle, and no disease of coconuts not found in Fiji was observed either here or in Fotuna.

The yield of nuts was not as heavy as I expected. This is partly no doubt on account of the trees being planted too closely together in many cases, and also the ground below being allowed to become heavily over-grown, but there is also another reason, and one of considerable importance, and that is that the natives cut the leaves for fish traps, there being few reeds in this island, they also use them for blinds for their houses and similar purposes. Further all copra is cut in the field, and carried in baskets made from the same leaves and sold green to the stores, and all this makes a very heavy drain upon the foliage of the trees, and must naturally reduce the yields. There are however many nuts of exceptionally fine quality and size.

Copra.

This is cut in the field as stated above, and sold green to the storekeepers who dry it on vatas as in Fiji, and is of much better quality than that produced in Fotuna.

Bananas.

Bunchy top was widely distributed as also was the borer, *Cosmopolites sordida*. These diseases have I understand been recently introduced from Fiji, and as bananas form one of the main foods of the natives are likely to prove very serious.

General.

I crossed the island to a point about six miles from the port. The first portion was very densely cultivated with coconuts, bananas, taro, &c. This was followed by an area of poor land covered with Vau, Pandanus, &c., after which one entered an area of cultivated land again with a certain amount of secondary forest growth. Although this land is partly reserved for food crops, nuts are allowed to grow up, and a good deal of copra is made here. It was here that I had most opportunity of examining young trees. At the end of my journey was an extinct crater with perpendicular sides, and a large lake 450 feet below the level of the surrounding country at the bottom. A portion of the original indigenous forest remains round this crater, and I took several insects which whilst not of special economic importance, were of interest as showing relationship partly to Fiji and partly to Samoa. Coconuts grow right up to the edge of the crater.

The hornet of Fiji (*Polistes* sp.) has not reached either of these islands yet, but in Fotuna there is a smaller black and red species, of which I saw some hundreds of nests on one tree alone, but all were small. It did not seem to be present in Wallis.

General Conclusions.

I found no disease of either coconuts or bananas which is not present in Fiji, and therefore so far as these main crops of ours are concerned I do not think that at the present time we have anything to fear from the continued

importation of dry copra. The presence of the two banana diseases which I am informed were recently imported from Fiji shows the danger of unrestricted importations. The tobacco moth is a danger to a minor crop of Fiji, and it is to guard against such that I have so strongly advocated some method of fumigation.

Thanks.

In conclusion I wish to express my thanks to M. Becu, the Administrator, and his Secretary, M. Joubert, who extended me every courtesy as also did the King. To the Reverend Father Haumonte, Acting Commissioner of Fotuna, for kind hospitality as also to M. Brail of Wallis and M. Peterson of Fotuna for kind assistance. I also have to thank Mr. McKenzie of Messrs. Burns Philp, and Mr. Haycock their Accountant, and Captain Dixon of the "Makoa," who gave me every facility to carry out my duties.

VISIT TO VANUALEVU AND TAVEUNI.

By H. W. Simmonds, F.E.S., Acting Government Entomologist.

Lekutu.

I reached Lekutu on the dry side of Vanualevu on 16th February. This is a coconut area purely. No bud-rot has yet been found on this estate, whilst it was comparatively free from spathe borer, *Acritocera negligens* Butl, and *Agonoxena argaula*. Oranges and mandarins were already suffering from the attack of the orange sucking moth, *Othreis fultonica* Linn or near ally. No fruit flies were observed.

Lekutu to Savusavu.

From Lekutu I made my way over-land to Wainunu, being accompanied by Mr. Forsyth. Here when passing through a bush track Mr. Forsyth called my attention to the presence of coconut scale, *Aspidiotus destructor*, on the leaf of a bush orchid. As this disease had not previously been reported from Vanualevu I knew it had probably come from some adjoining native village, we therefore followed the track up to the village of Nadua, and there found scale present on bananas and one coconut. I therefore left Mr. Forsyth to get the Buli, and together they went through the area of cultivation here, and in the adjoining villages, finding scale present in one other village, and destroying all found. It is much to be hoped that we have arrested this disease in time, but it will be necessary for an Inspector to visit the district regularly for some considerable time. Bud-rot was very prevalent here, and at Wainunu and at Vakasani.

From Wainunu to Savusavu one day was spent at Waiwai. Phasmidæ, *Lopaphus cocophagus* News, were doing much damage here, and all through the district. I saw here one fruit fly (*Dacus passifloriae*), but as at Lekutu it was the moth, *Othreis fultonica* Linn, which was destroying most of the orange crop.

From Savusavu to Taveuni.

From Savusavu I went to Mua in Taveuni calling at Vunilagi enroute. The attack of *Promecotheca reichei* and *A. argaula* Meyr observed a year ago had quite passed. At Mua the traps which I had set for the spathe borer yielded no result.

Soqulu.

From Mua I proceeded to Soqulu where I saw two apparent bud-rot cases. One was far gone and badly affected with larvæ of the moth *Trachycentra chlorogramma* Meyr as had been previously noticed by Jepson, and which I had also found in certain bud-rot trees at Vuna. The other was not a typical case of bud-rot, as it had not reached the bud, but seemed to be travelling down the heart leaf, which was turning black and had developed the typical smell. A culture was made from this, and upon examination I found it to be swarming with nematode worms.

Disease of New Guinea Bean.

A member of the *Cucurbitaceae* often called the New Guinea Bean was absolutely defoliated by the larvæ of a moth and the ravages of the beetle *Anlocophora fabricii*. The moth was bred out and proved to be one of the *Pyralidæ*, of a silvery-white colour with black margins, and has been since identified as *Margaronia indica* Saund a native of India.

Ura and Selialevu.

Ura and Salialevu were next visited. At Ura the homestead is lighted with acteylene gas and this proved attractive to certain moths. Amongst these were two specimens of the big spathe coconut moth *Acritocera negligens* Butl and a number of the smaller young nut moth *Tirathaba trichogrammia*. This was a most important discovery, because if these moths which do so much damage to coconuts can be attracted to light it may be possible to trap them in this way, and I propose to carry out experiments with this end in view on my next visit to one of the coconut areas.

Citrus fruits throughout Taveuni also were much destroyed by the same *Othreis fultonica* and I strongly advised the destruction of all Drala trees (*Erythrina indica*) upon which the larvæ of this moth feed.

CACAO IN FIJI.

By H. W. Simmonds, F.E.S., Acting Government Entomologist.

I saw at Wainunu a considerable area of cacao. The blocks of trees were however too scattered for economical working, and in many parts were I consider overshaded. It has been found in Trinidad, and elsewhere in the West Indies that cacao does not require the amount of shade formerly supposed, and it was most noticeable here that those trees growing in the open were very much healthier in appearance than those under dense shade.

Cacao is much damaged by the attacks of the Japanese rose beetle (*Adoretus tenuimaculatus*, Waterhouse), and I saw a tree at Lekutu with its foliage riddled. This year however the beetle seems to have done little or no damage in the whole Savusavu area (as also in Suva), and it was very noticeable that the old leaves at Wainunu had been eaten, whilst the new ones were quite sound.

Many other trees such as *Acalypha* sp. are attacked by this beetle, and it may be possible to use some as traps if it can be shown that the beetle shows any preference for one species over another.

On my way to Savusavu I spent a day at Waibalabala, where I saw many more cacao trees. These were planted 13–14 years ago, but were

destroyed in the 1912 hurricane, and had been neglected since then. They were quite free from *Adoretus* attacks.

Cacao Cultivation in Fiji.

I would like to call attention to the possibility of cacao cultivation in Fiji. The price of best Trinidad cacao in May last was £54–£58 per ton, whilst in October best Samoan fetched £75. These are approximately pre-war prices. The present price offering for Fijian in New Zealand is £68 which compares very favourably with the West Indian prices.

In comparing yields per acre with copra the advantage is very heavily with cacao. An average estate of cacao should yield ¼ ton of dry cacao per acre which at £60 per ton will work out at £15 per acre gross, whilst coconuts in Fiji average also about ¼ ton of copra to the acre which at £24 per ton in London yields £6 per acre gross.

The cost of marketing too is all in favour of cacao which can be landed in New Zealand, where there is a considerable market at 70s. per ton from Vanualevu. Copra on the other hand costs over £7 per ton to reach London, and the beach price in Taveuni is about £10 below London. Copra therefore costs from 27½ per cent. to 33¼ per cent. to market whilst cacao costs less than 7½ per cent. Further once established the intense shade of cacao renders weeding a very easy proposition as compared to coconuts.

Cacao is a garden crop and should be grown in 50–70 acre blocks only. It requires pruning, and spraying, and careful personal attention. Cacao also comes into bearing about two years earlier than coconuts. There is much land suitable for the cultivation of this crop in Fiji, but such land would require to be carefully selected and well sheltered from the S.E. winds.

ENTOMOLOGICAL NOTES.

By H. W. Simmonds, F.E.S., Acting Government Entomologist.

Bulbuls and Hornets.

When at Nadi I observed Bulbuls catching Hornets (*Polistes hebræus F.*) on the wing in the garden of the house that I was staying at. I saw at least half a dozen captured within the space of about half an hour. This must prove an important controlling influence upon this insect, especially at this season, when the perfect males and females are sunning themselves during their hibernation period.

Coconuts.

The whole coast between Penang and Nadi is at present remarkably clear of *Levuana iridescens*, only one or two patches being observed, whilst the yield of nuts is very heavy. Scale (*Aspidiotus destructor*) is however doing much damage at one or two places in Nadi.

House Fly Parasite.

The hymenopterous parasite of the house fly *Musca domestica* which was found in pupæ in stable manure in Suva, has now been identified as a *Spalangia* sp. Two or three species of this genus are known as parasites of *Diptera* in Queensland and Hawaii, and ours has probably been introduced from one of these sources.

Leaf Mining Beetle of Coconuts (*Promecotheca reichei Baly.*)

This beetle one of the Hispides does much damage to coconuts periodically in certain parts of Fiji. The beetle is about three-eighths of an inch long, the head, thorax, and front portion of the elytra being dull yellow, whilst the remainder of the elytra is dark steel blue.

The beetle damages the palms in two ways:—

1. The beetle itself chews the leaves, eating lines on the under surface, and causing damage very similar to the attacks of the leaf eating moths *Agonoxena argaula* and *Levuana iridescens*.
2. By the attacks of its larvæ which mine between the two surfaces of the leaves, giving a tree which has been badly attacked a greyish appearance as if scalding water had been poured over it.

The egg is laid on the under surface of the leaf, and covered with a small lump of excreta, so that it bears some resemblance to a scale. The larva penetrates the leaf and feeding between its two surfaces causes a brown patch about 4½ inches long, ⅛ inch wide at the egg end and perhaps ¾ inch at the extremity. A large number however do not extend more than an inch in length owing to the attack of parasites; the tiny hole made by which can be easily observed. This parasite a species of *Elasmus* only seems to attack the larvæ in their first stage.

When at Cicia in December, I collected a large number of the eggs and mines of this beetle and from them bred out an egg parasite also. This is a very minute yellow *Chalcid*; and proves to be a new species of *Chætostricha*.

The action of these two parasites is to generally overcome an outbreak of the disease in any one area, which thus goes in a series of waves. Allied species to *P. reichei* are found everywhere between Fiji and the Philippines.

Banana Borer (*Cosmopolites sordida.*)

When at Buca Bay in December a careful search was made for this beetle, and so far as I was able to ascertain it did not occur at Deloi or Rabi. Bunchy top was also absent from both these two estates, although one small patch was found on Kioa, and a promise was given to destroy that.

I would suggest that, as the borer is the greatest difficulty with which growers have to contend, if a nursery were established in this district, from this clean stock, they could then supply other portions of Fiji with clean suckers, when if land on which no bananas had been grown for twelve months were used to form the estate it should not be difficult to keep the borer within bounds, as this beetle has never been known to fly but only crawls. This is a matter that banana growers should consider seriously.

NOTICES.

COCONUT SCALE.

In accordance with Regulation 14 of the Regulations made by the Governor in Council on the 29th November, 1913, in pursuance of section 6 of the Diseases of Plants Ordinance 1913, His Excellency the Governor defines the following areas in which the disease of coconut scale (*Aspidiotus* species) exists:—The islands of Ovalau, Moturiki, Beqa, Yanuca, Kadavu, Vitilevu, and the small islands within three miles of the coast of each of such islands (see *Royal Gazette*, 1919, p. 346); also the islands of Vatulele, Wakaya, and Naigani (see *Royal Gazette*, 1920, p. 34).

In order to prevent the spread of this disease Regulations were made by the Governor in Council on 22nd August, 1919, in pursuance of section 6 of the Diseases of Plants Ordinance 1913 (see *Royal Gazette*, 1919, pp. 345–6). These Regulations are reprinted below for general information and the attention of *all* planters not within the above defined areas is called to these Regulations, and especially to sections 4, 5, and 6. It is very difficult to carry out these Regulations unless planters in non-infected areas will co-operate with this Department. If planters in those areas free from coconut scale will give their help by reporting breaches of these Regulations in accordance with section 5 they will not only be helping this Department to prevent the spread of a serious disease which endangers one of our most important industries, but they will also be helping to protect their own estates from infection.

Restriction of Shipping from Certain Places.

" 1. The master or person in charge of a vessel of any description except as hereafter provided, being at any place within an area defined as being an area in which Coconut Scale (*Aspidiotus species*) exists and intending to call at any place in the group not within such defined area must immediately before proceeding to such place take his vessel to either the port of Suva, the port of Levuka, or the port of Lautoka, where he must report to the Inspector of Plants, who may detain, board, and search such vessel for the purposes of these Regulations, and who shall satisfy himself that no disease declared under Regulation 13 of the Regulations made by the Governor in Council on the 29th day of November, 1913, under section 6 of the Diseases of Plants Ordinance 1913, is likely to be carried by means of the vessel to other places, and who may seize and destroy any plant matter which in his opinion is likely to spread a declared disease.

" 2. The Inspector shall then issue a certificate to the master or person in charge of the vessel stating that to the best of his knowledge and belief the vessel is free from material affected by a declared disease.

" 3. The master or person in charge of a vessel may not leave the port of Suva, or Levuka, or Lautoka until the Inspector has handed him the certificate as provided by Regulation 2 of these Regulations and he must produce such certificate when required by any person to do so.

" 4. Any person in any part of the group not within an area defined as being an area in which Coconut Scale (*Aspidiotus species*) exists may request the master or person in charge of a vessel to state where his vessel has called during its present trip, and it shall be the duty of the master or person in charge of such vessel to supply the information and to produce the certificate of an Inspector issued to him at Suva, or Levuka, or Lautoka.

" 5. Any person finding or having reasonable grounds to suspect that the master or person in charge of a vessel has not complied with Regulation 1 of these Regulations shall immediately report the circumstances to the Superintendent of Agriculture, and to either a District Commissioner, an Inspector of Plants, or an Officer of Constabulary, any one of whom shall cause an inquiry to be made.

" 6. Any officer of the Government or any person having control of fifty or more acres planted with coconuts and being at the time at a place not within an area defined as being an area in which Coconut Scale (*Aspidiotus species*) exists may seize and destroy without compensation any plant matter affected by a declared disease landed from a vessel.

" 7. Any person failing to carry out or comply with the provisions of these Regulations or who disregards or refuses to obey an order of an Inspector

when engaged upon his duties or who refuses to supply information or to produce an Inspector's certificate or who gives false information, shall be liable to a penalty not exceeding twenty-five pounds or to imprisonment for a period not exceeding two months.

"8. These Regulations shall not apply to the following vessels:—

"(*a*) ships of His Majesty's Navy;

"(*b*) vessels owned or chartered by the Colonial Government;

"(*c*) foreign-going steamships engaged upon their ordinary trade."

IMPORTATION OF GRASSES.

The attention of planters is called to Proclamation No. 8 of 1922, published in the *Royal Gazette*, No. 22 of 1922, p. 118. This Proclamation applies to pasture grasses and fodder grasses, that is members of the natural order *Gramineae*, but does not apply to clovers, lucerne, and other legumes which are members of the natural order *Leguminosae*.

All seeds, live-stems, and whole plants of pasture grasses and fodder grasses imported from Australia and New Zealand must be accompanied by a certificate in the form set out in the Schedule to the Proclamation (see below) signed by a responsible officer of the Department of Agriculture of the country where the grass was grown certifying that the district in which it was produced is entirely free from cattle tick infestation.

Under this same Proclamation the importation of all seeds, live-stems, and whole plants of pasture grasses and fodder grasses is prohibited except under a written permit from the Superintendent of Agriculture, provided that the said prohibition shall not apply to the seeds, live-stems, and whole plants of *Panicum barbinode* (Paragrass), *Panicum maximum* (Guinea grass), or *Paspalum* species imported from countries other than Australia and New Zealand.

In accordance with section 4 of Ordinance VI of 1913, the seeds, live-stems, and whole plants of pasture grasses and fodder grasses "imported in contravention of such prohibition shall be forthwith destroyed and no action shall lie for such destruction."

SCHEDULE.

I hereby certify that the shipment of..... grass seeds marks.....
No. of packages.....contents.....addressed to.....
sent by..... per..... were produced in a district entirely free from cattle tick infestation.

(*Signature of officer*) .....
(*Official designation*) .....
(*Address*).....
(*Date*) .....*day of* .....19...

PALM SEEDS.

The seeds of palms are being collected at the Botanical Gardens, Suva, and seeds of the following palms can be obtained from the Department of Agriculture at the prices stated below:—

Sagus vitiensis, the sago-palm of Fiji, native name *soga* ..	½d. each.
Raphis vinifera, A West African palm	½d. each.
Pritchardia pacifica, the fan-palm of Fiji, native name *viu* or *masei*	3d. per doz.
Chrysalidocarpus lutescens, a palm from Madagascar ..	3d. per doz.

The seeds of other palms will be offered for sale when they are available.

THE PEANUT: A STAPLE CROP.

(Agricultural Extension Notes published by the Porto Rico Agricultural Experiment Station, No. 44, 15th March, 1922, by D. W. May.)

One of the needs of the body supplied by foods is fats. In our home-grown products there is usually a shortage of these. We import almost all the fats used in our dietary. These come in the form of lard, cotton seed oil, olive oil, and butter. We ought to grow and produce more of these foods. Among the sources of fat the peanut now holds a very important place. Before the war we imported a great deal of peanut oil as a salad oil and as a constituent of oleo-margarine from France. In Marseilles there are large mills that produce quantities of oil from peanuts most of them coming from Africa and India. The nut contains about 50 per cent. of oil which is used as human food while the by-product or peanut cake is employed in feeding cattle and hogs. Two or three grades of oil are obtained from the peanut. The first, made by cold pressure, is the edible salad oil. The second grade is used in the manufacture of oleo-margarine and as cooking fat. The lower grades of peanut oil are used in soap making and for other manufacturing purposes. From the residue there is made peanut butter, which is increasing rapidly in use, and the final residue of the cake makes an excellent stock feed for animals.

In Porto Rico we grow very few peanuts and then only to be eaten roasted while we import large quantities of manufactured products from the peanut. It is easily grown here and should be more extensively planted. We look upon it as a small crop not realising the importance it has reached in feeding the peoples of the world. The peanut is an accommodating crop, maturing in 100 days and grown during weather comparatively dry. It can be planted between other crops and being a legume will greatly improve the soil for succeeding crops. If the price of the nuts and the cost of labour do not justify harvesting same the vines may be pastured by cattle and the nuts harvested by hogs. There are two general classes of peanuts: the larger of which is represented by the variety Virginia Runner, and the smaller one by the variety Spanish. As a confection, the large one is usually employed and it also produces more forage, but for oil making and feed the smaller one is preferred. In Porto Rico we grow usually the Spanish or small peanut. It is advisable to select seed from good strains so as to improve the yields. It is a good idea also to try out both varieties and hold to the best. . . . . Loamy and sandy soils are best adapted to peanut growing. Before planting, the nuts should be either shelled or else soaked in water from 36 to 48 hours. The distance of planting depends upon the variety and fertility of the soil, the running kind wider than the bunch peanuts. Where they are planted in large anounts they should be so spaced so as to permit the use of machinery in cultivating. The peanut, being a legume, obtains its nitrogen from the air. Therefore, it is not advisable to use nitrogenous fertilisers; in fact, such are inclined to make the peanuts produce a greater growth of vines but a lessened yield of nuts. Phosphoric acid is the most important element needed and potash second. Lime should be applied if the land is sour. For small patches no special tools or machines are needed. Where the nuts are grown on a large scale it is advisable to use machines which may be obtained for planting, digging, picking, and shelling the nuts. The prices of the various products should indicate the best method in harvesting. Each portion of the plant is useful and should be disposed of in a way that

yields the greatest profit. The logical market for the nut is the oil mill that will extract the larger part of the oil for human consumption, leaving the cake for feeding to live-stock. The vines should be fed to live-stock and the manure returned to the field. Where there are no mills for crushing the nuts and there is a local market for only a small amount of them the vines should be cut for hay or pastured by cattle and afterwards the nuts harvested by hogs in the field. The peanut yields from 25 to 50 bushels of nuts per acre; of hay, which is nearly equal to clover or alfalfa, one to three tons per acre.

METEOROLOGICAL OBSERVATIONS

TAKEN AT SUVA, MARCH TO JUNE, 1922.

Date.	MARCH.			APRIL.			MAY.			JUNE.		
	Temperature		Rain.	Temperature		Rain.	Temperature		Rain.	Temperature		Rain.
	Max.	Min.		Max.	Min.		Max.	Min.		Max.	Min.	
	°	°	"	°	°	"	°	°	"	°	°	"
1	88·6	72·4	..	86·6	72·2	·35	81·0	69·2	2·30	86·2	68·4	..
2	88·0	73·0	·70	85·4	70·6	·85	79·4	67·0	·10	85·4	68·0	..
3	87·6	70·4	·60	80·2	72·2	1·80	80·2	64·0	..	86·0	67·0	..
4	87·8	69·8	..	79·4	71·8	·70	80·0	60·2	·25	82·6	66·4	..
5	87·4	70·5	..	82·0	71·0	·30	81·6	61·0	..	82·4	68·0	..
6	87·0	74·0	·16	81·6	70·2	·95	82·0	60·6	..	83·6	68·2	..
7	88·4	73·6	·20	82·2	69·4	..	82·2	60·4	..	83·0	67·8	·20
8	89·0	74·0	·15	87·2	69·0	·10	80·6	64·0	..	83·6	67·0	..
9	88·6	73·6	..	87·0	69·2	1·65	81·0	63·6	..	84·0	68·4	·10
10	89·4	72·8	·24	88·4	72·4	..	80·4	64·0	·20	84·4	66·8	..
11	89·6	73·0	·22	87·0	72·8	..	81·8	63·6	·15	84·2	62·8	·10
12	89·0	72·8	..	86·4	68·6	..	82·4	63·0	..	84·6	63·0	·15
13	84·4	73·0	·90	87·0	70·0	..	82·8	64·0	·55	83·2	61·0	..
14	88·2	72·6	·10	88·2	72·0	..	82·0	64·0	·30	84·0	60·2	..
15	88·0	71·8	..	87·2	69·0	..	79·0	68·6	..	84·2	60·6	..
16	87·6	72·4	·25	87·0	70·0	1·40	78·4	68·0	..	83·4	62·2	·40
17	88·0	71·8	..	87·0	71·0	..	83·2	68·4	..	84·0	62·8	..
18	88·2	72·0	8·30	85·0	72·2	·30	83·6	72·0	·15	84·4	64·0	..
19	84·0	71·8	6·80	84·6	71·8	..	83·0	71·4	·10	84·0	63·8	..
20	85·2	72·4	·45	80·0	68·2	·70	83·4	72·0	·30	84·6	64·2	..
21	86·0	71·6	1·00	86·2	68·6	..	83·2	72·0	·50	85·4	66·0	..
22	85·4	71·2	1·95	87·0	69·4	..	81·0	70·2	·10	84·0	63·2	·07
23	86·0	70·2	·70	87·2	68·0	·04	81·2	70·6	·12	84·2	63·4	·15
24	85·8	69·4	·10	84·6	70·0	..	81·0	69·8	2·60	84·6	64·0	..
25	86·6	70·0	1·15	83·0	67·6	·20	81·4	70·2	·30	84·4	69·2	..
26	84·0	70·2	·35	84·2	67·0	..	82·6	69·4	..	84·0	68·6	·20
27	84·6	71·8	·40	84·0	67·4	·30	86·2	70·0	·15	86·0	68·2	·25
28	84·0	72·4	1·75	83·4	66·8	2·10	86·0	69·8	·10	84·2	67·0	·20
29	84·6	70·8	·40	84·0	67·2	·22	85·6	69·4	..	84·6	65·8	..
30	86·8	70·4	·20	84·8	67·0	·45	85·0	68·6	·15	85·0	65·2	..
31	86·0	72·2	2·45	..	..	..	84·8	68·2	..	..	..	..
	..	..	29·52	..	..	12·41	..	..	8·42	..	..	1·82

ACTUAL RAINFALL FOR THE YEAR ENDING 31ST DECEMBER, 1921.

Province.	Station.	Observer.	January.	February.	March.	April.	May.	June.	July.	August.	September	October	November.	December.	Total for 1921.	Average.
			"	"	"	"	"	"	"	"	"	"	"	"	"	"
Ba	Namosau	District Commr...	39·90	17·25	24·67	16·22	1·44	..	7·00	5·00	1·50	3·50	4·75	11·00	132·23	92·67
Ba	Navisa.....	C.S.R. Co., Ltd. ..	35·38	16·58	17·98	15·17	·20	·70	2·77	6·00	4·50	3·90	2·45	20·57	126·20	88·30
Ba	Rarawai	C.S.R. Co., Ltd. ..	28·59	14·73	9·97	10·76	·06	·18	2·49	6·36	2·99	2·89	3·42	14·61	97·05	78·79
Bua	Baulailai	F. W. Whittstock	17·70	10·30	9·80	27·20	·10	..	·60	1·50	1·00	1·40	3·50	24·40	97·50	83·65
Bua	Nabouwalu	Roko Tui Bua ...	20·55	11·48	19·00	26·93	3·23	3·47	3·10	5·49	5·60	3·35	13·58	22·98	138·76	101·59
Bua	Wainunu.....	S. E. Martin	26·20	18·62	19·47	33·55	9·23	2·68	5·92	6·15	11·60	6·65	15·00	28·40	183·47	149·46
Cakaudrove .	Buca Bay	W. C. Fisher	14·82	10·30	14·33	17·08	4·61	1·30	·87	3·02	2·36	·24	8·65	25·01	102·59	99·52
Cakaudrove .	Rabi	P. Lyons	17·91	8·60	15·32	23·69	9·95	2·63	4·26	3·40	4·83	2·79	9·16	31·52	134·06	153·06*
Cakaudrove .	Savusavu Bay ...	Wireless Station..	15·95	8·33	9·74	21·82	4·73	1·72	2·46	2·99	4·06	5·13	11·70	12·89	101·52	106·31*
Cakaudrove .	Vuna, Taveuni ..	Tarte Bros.	13·37	11·60	11·34	20·30	9·73	1·70	6·34	5·05	10·45	11·70	12·71	22·94	137·23	138·83*
Cakaudrove .	Waiyevo, Taveuni	Wireless Station..	12·76	9·97	10·52	13·58	7·45	1·51	4·00	2·00	5·93	6·24	12·32	10·68	96·96	101·89*
Colo East ...	Vunidawa	District Commr...	21·74	15·71	30·85	29·19	6·82	4·04	3·10	12·48	12·32	3·10	17·00	28·42	184·77	138·70
Colo North ..	Nadarivatu.....	District Commr...	43·31	15·20	20·33	19·07	·50	1·28	3·94	2·48	4·84	1·76	6·58	10·62	129·91	129·17
Colo North ..	Tavua	C.S.R. Co., Ltd. ..	20·01	10·21	8·91	8·97	..	·20	1·39	2·80	1·55	1·86	2·00	11·88	69·78	67·68
Lau	Munia	H. H. Steinmetz..	10·23	4·21	10·94	25·48	1·66	·96	4·35	·89	2·41	·53	4·52	12·36	78·54	70·03
Lau	Nabavatu	Hennings & Allardyce.	10·34	5·63	12·91	23·14	3·59	1·25	5·12	·78	4·35	1·30	6·45	16·00	90·86	76·14
Lautoka	Lautoka	C.S.R. Co., Ltd. ..	25·03	20·57	12·08	11·30	·09	·07	2·03	3·17	1·49	6·99	1·89	9·58	94·29	66·41
Lomaiviti ...	Levuka.....	Harbour Master .	28·10	10·71	10·74	33·43	3·65	4·70	2·72	6·55	6·36	4·20	16·52	21·65	149·33	91·38
Lomaiviti ...	Makogai	Res. Med. Supt. ..	10·48	5·37	8·31	25·53	1·21	1·53	2·08	2·60	5·72	2·46	4·51	13·31	83·11	77·09
Macuata	Labasa	C.S.R. Co., Ltd. ..	27·46	9·91	12·08	25·55	·93	·66	1·28	·65	2·00	·71	6·00	18·19	105·42	80·48
Nadi	Navo	C.S.R. Co., Ltd. ..	29·25	14·85	9·75	15·39	..	·09	2·21	4·25	1·49	3·73	1·93	12·80	95·74	61·92
Nadroga	Lawaqa	District Commr...	20·58	9·87	18·98	16·57	1·61	1·57	1·86	7·78	2·54	5·11	2·70	5·46	94·63	69·20
Ra	Rakiraki	Penang Sugar Co.	12·97	13·71	8·67	13·05	·84	·93	1·19	4·05	·79	2·12	3·54	15·00	76·86	81·63*
Rewa	Suva	Supt. of Agric. ...	20·49	11·38	17·20	27·02	8·86	5·03	4·85	11·30	10·03	4·91	20·27	29·40	170·74	114·55
Serua	Naitonitoni.....	District Commr...	20·30	14·69	14·63	27·51	9·39	4·17	4·35	14·83	7·75	11·01	29·56	33·95	192·14	138·42
Serua	Tamunua	V.F.S. Co.	21·09	14·91	13·99	30·60	10·38	4·66	5·47	9·99	10·83	9·14	23·22	30·88	185·16	142·82
Tailevu	Nausori	C.S.R. Co., Ltd. ..	22·66	11·67	10·79	31·00	5·65	3·54	3·49	8·12	7·47	5·63	9·83	34·78	154·63	112·38
Rotuma	Rotuma	Resident Commr..	15·59	11·85	9·19	16·25	22·08	4·04	8·15	17·92	8·31	4·95	13·71	16·59	148·63	135·59

Stations marked * below the average. All other Stations are above the average.

Agricultural Associations in Fiji.

THE COUNCIL OF PLANTERS OF FIJI.

Chairman.....MR. J. L. HUNT.

Vice-Chairman.....MR. E. DUNCAN.

Secretary and Treasurer.....A. E. S. KEELY.

ASSOCIATED BODIES.

THE CAKAUDROVE COPRA GROWERS' ASSOCIATION.

THE CANE GROWERS' ASSOCIATION OF FIJI (BA AND NADI BRANCHES.)

THE LABASA PLANTERS' ASSOCIATION.

THE SAVUSAVU PLANTERS' ASSOCIATION.

THE SOUTHERN DISTRICTS PLANTERS' ASSOCIATION.

CONTENTS.

PAGE

COTTON, *by A. B. Ackland and C. H. Wright* 15

VISIT TO FOTUNA AND WALLIS ISLAND, *by H. W. Simmonds* .. 19

VISIT TO VANUALEVU AND TAVEUNI, *by H. W. Simmonds* 22

CACAO IN FIJI, *by H. W. Simmonds* 23

ENTOMOLOGICAL NOTES, *by H. W. Simmonds* 24

NOTICES:—

COCONUT SCALE 25

IMPORTATION OF GRASSES 27

PALM SEEDS 27

THE PEANUT 28

METEOROLOGICAL OBSERVATIONS, SUVA 29

ACTUAL RAINFALL DURING 1921 30